Mapping Estimates *and their Reliability* from the American Community Survey:
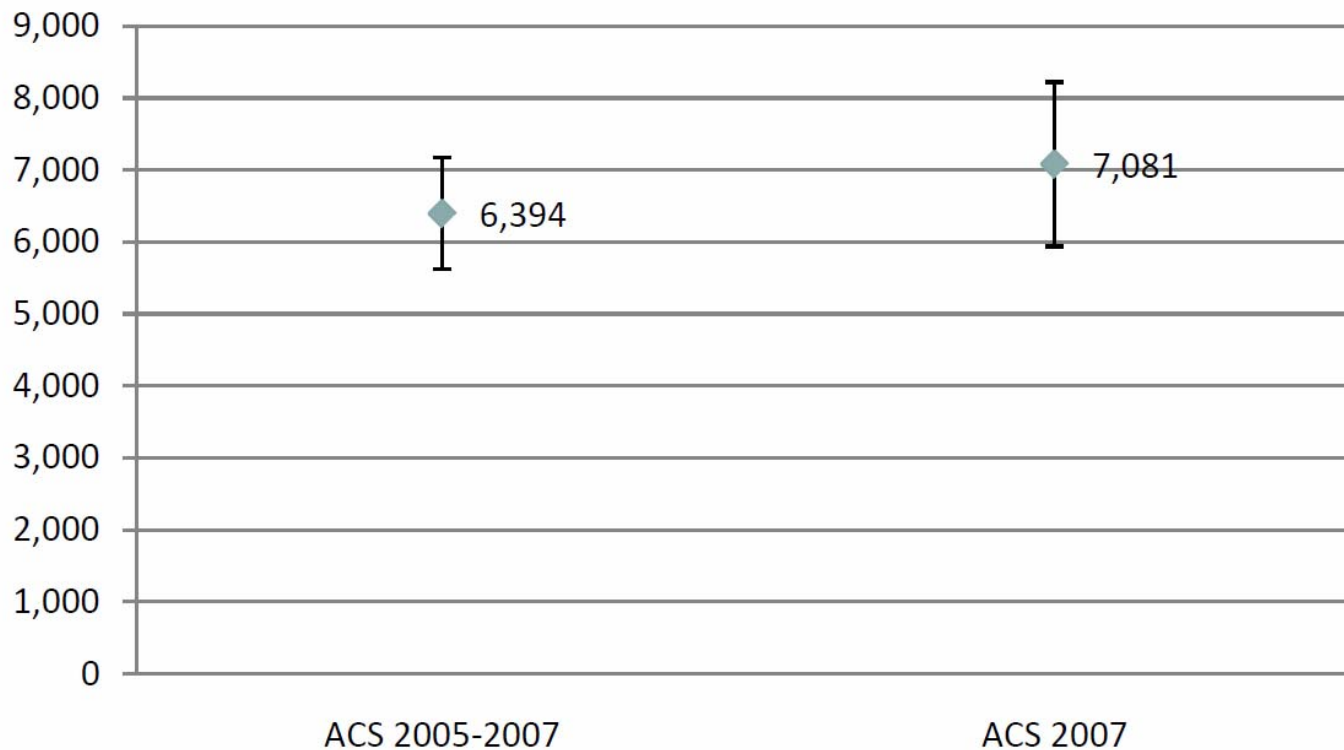
One user's struggle

David Long
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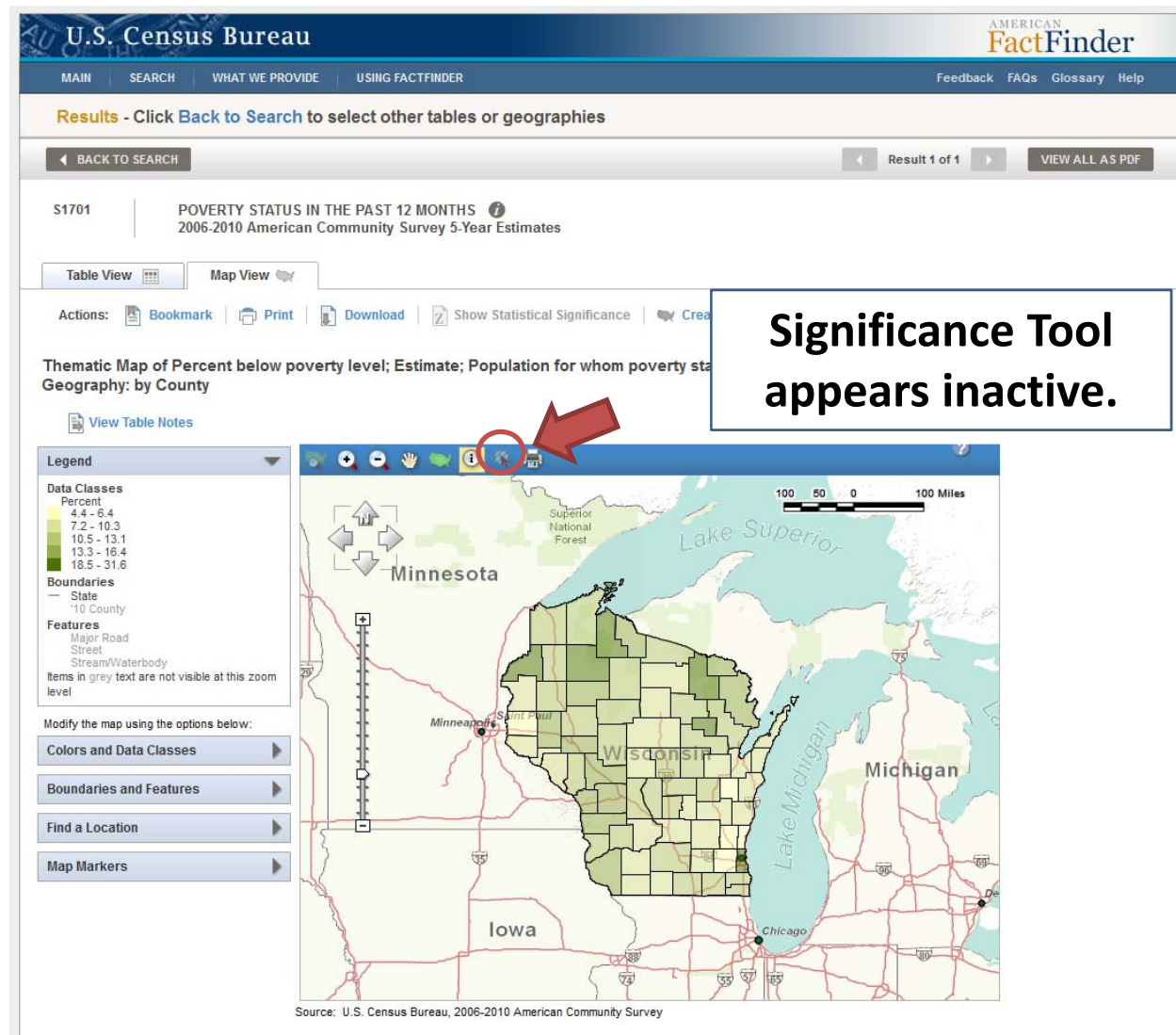Applied Population Laboratory, University of Wisconsin –Madison

Charting estimates and reliability:

Figure1: Seattle Women Aged 15 to 50 Who Had a Birth in the Past 12 Months

What does Census have to say?

What does ESRI have to say?

Stoplight approach based on Coefficient of Variation

The reliability is based on thresholds that Esri has established based on the usability of the estimates. Users should be aware that these are generalized thresholds:

- ■ High Reliability: Small CVs (less than or equal to 12 percent) are flagged green to indicate that the sampling error is small relative to the estimate, and the estimate is reasonably reliable.[5]

- ■ Medium Reliability: Estimates with CVs between 12 and 40 are flagged yellow—use with caution.

- ■ Low Reliability: Large CVs (over 40 percent) are flagged red to indicate that the sampling error is large relative to the estimate. The estimate is considered very unreliable.

Coefficient of Variation is the Standard Error as a Percentage of the Estimate

$$CV = \frac{\left(\dfrac{MOE}{1.645}\right)}{ESTIMATE} \times 100$$

Geography	Poverty Estimate	MOE	Standard Error	CV	Interpretation
Tract A	40%	+/- 3%	1.8%	5%	Very Reliable
Tract B	4%	+/- 3%	1.8%	46%	Not Reliable

Is the *Coefficient of Variation* a good indicator of reliability?

CV used in a Mapping Context

Race/ethnicity patterns by Census tract in New York City
2005-09 estimates --

WEST VIRGINIA

DELAWARE

DC

VIRGINIA

American Community Survey (ACS)
ACS Click on layer name to view data

- ○ Number of Households, est
- ○ CV for Number of Households
- ○ Median Household Income, est
- ● CV for Median Household Income

Legend

Median Household Income
(Coefficient of Variation)

- ▢ 0 (No Data)
- ▢ 0.01 - 14.99 (Reliable)
- ▢ 15.00 - 29.99 (Less Reliable)
- ▢ 30.00 - 100.23 (Not Reliable)

50 km

50 mi
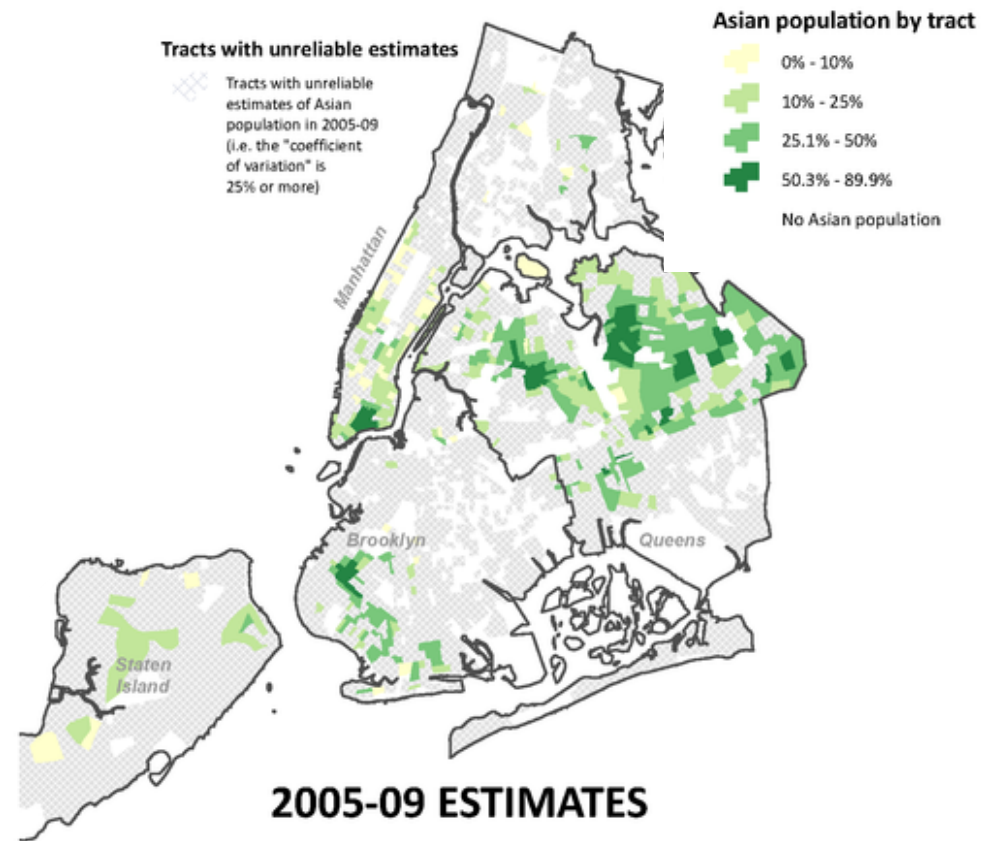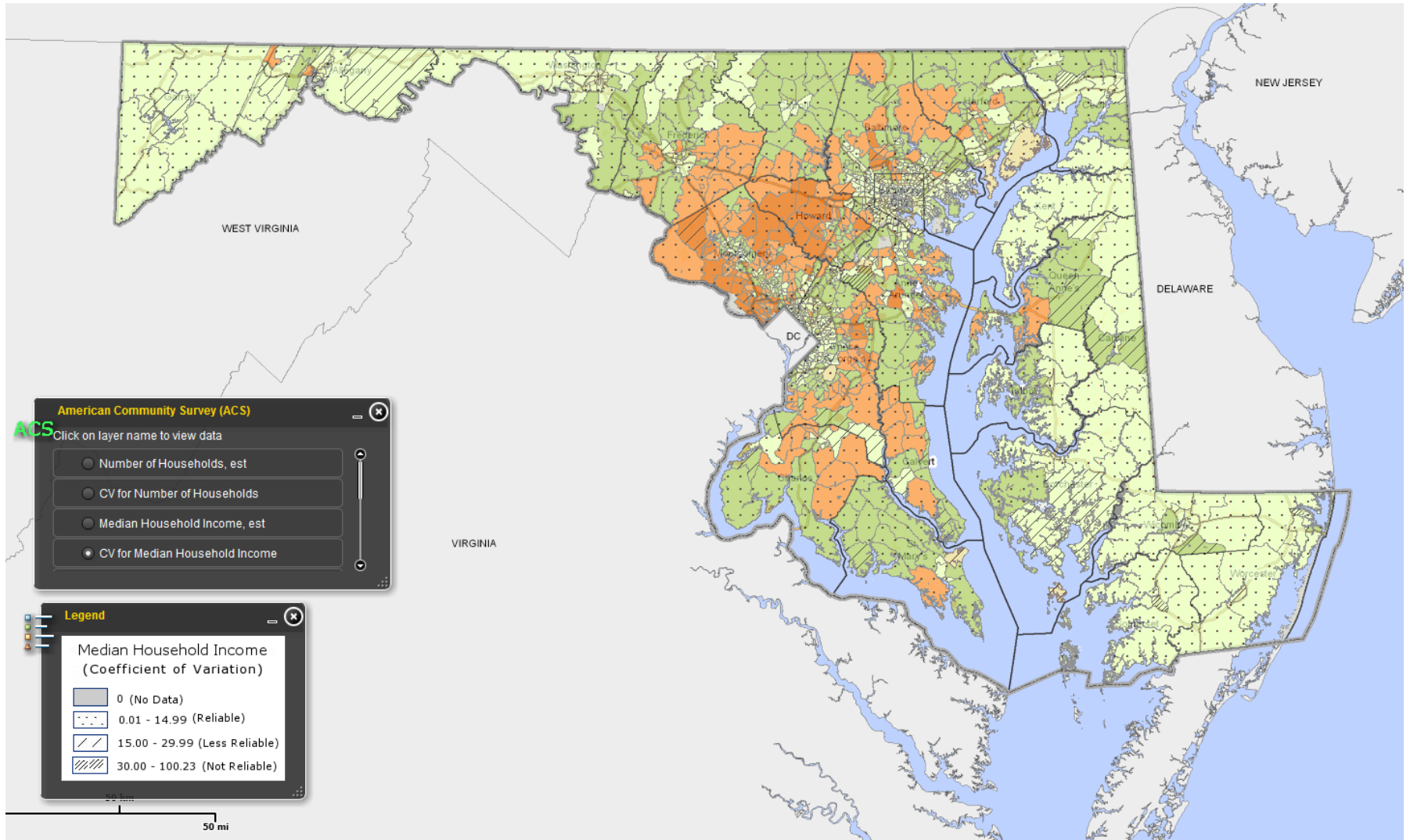
Maryland State Data Center Online Mapping

Quick Fix for ArcGIS Users?

David W. Wong, George Mason University
ArcGIS that created this Cross Hatch Overlay

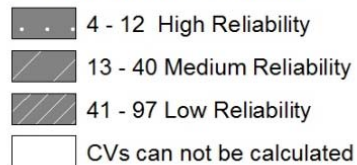Latino Poverty Rates by Significance

Coefficient of Variation
4 - 12 High Reliability
13 - 40 Medium Reliability
41 - 97 Low Reliability
CVs can not be calculated

Percent Poverty
0 - 11.2
11.3 - 18.9
19 - 27.1
27.2 - 36.1
36.2 - 52.5
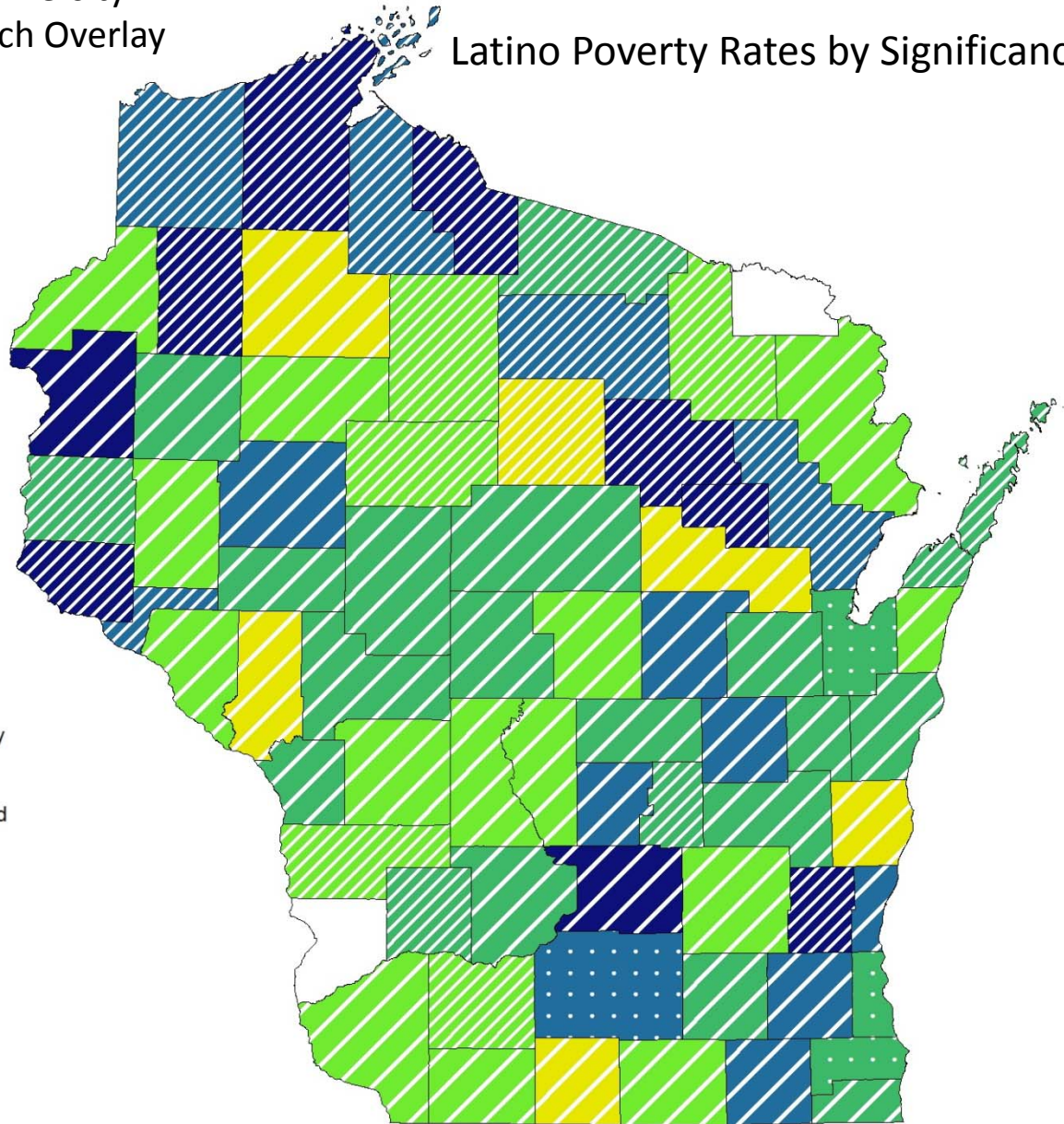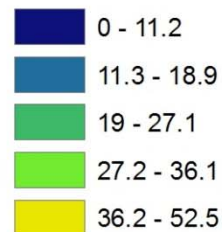
Problem #1: Which Measure?

- MOE
- CV
- Compare to Reference Geo
- Others…

Problem #2: Bivariate Mapping ☹

- Can be hard for viewers to decipher
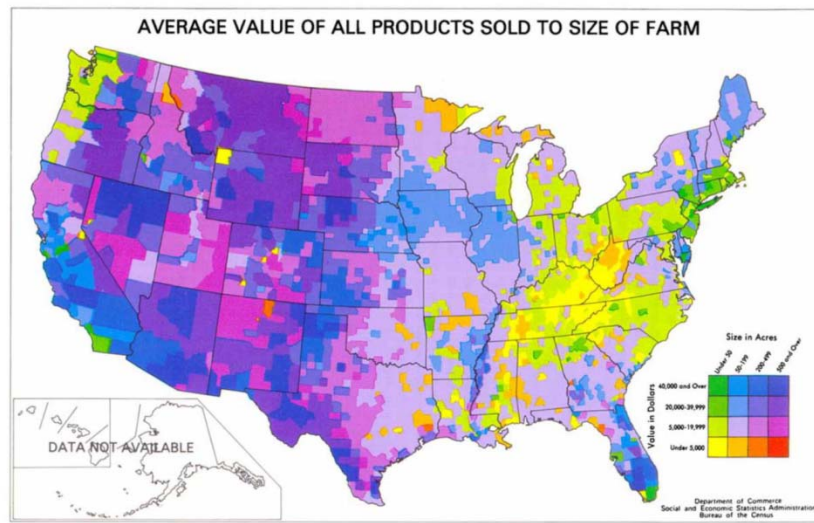
Figure 1: U.S. Census Map. Source: Olson 1981

Bars on a map…

Latino Poverty Rates by Significance
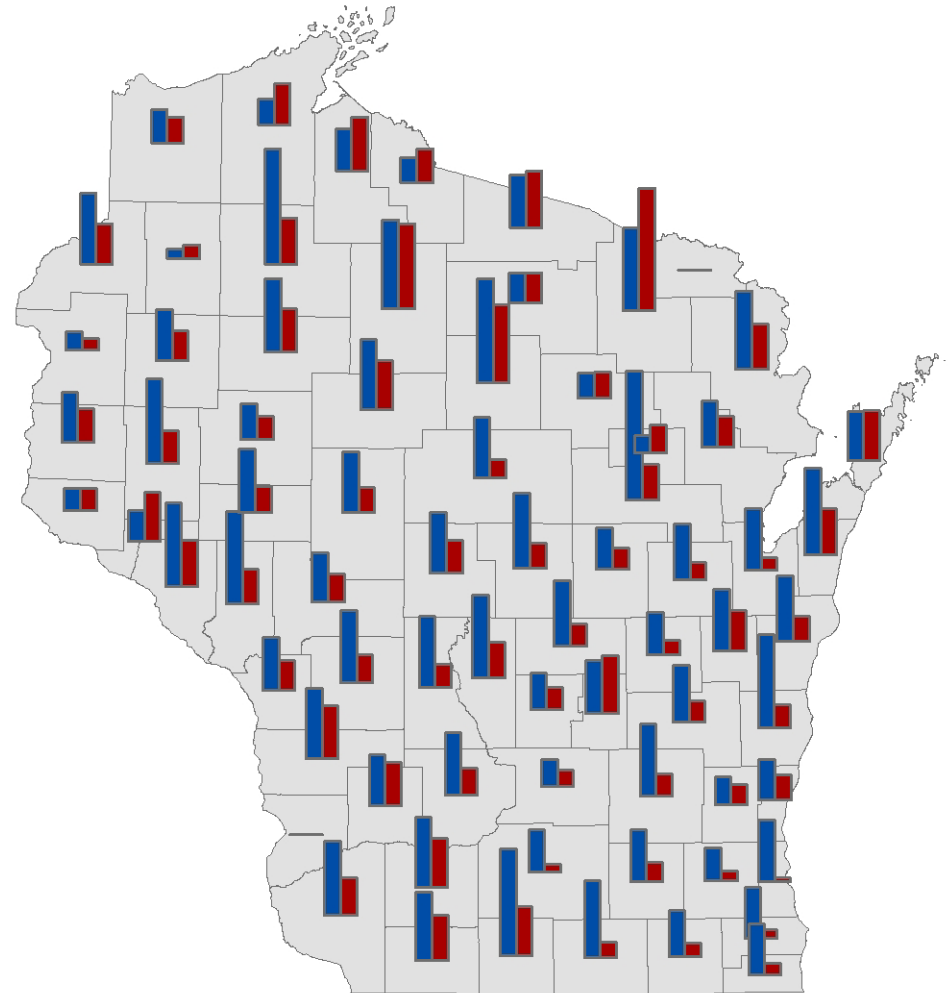
Percent Poverty
Margin of Error

Pies on a map…

Latino Poverty Rates by Significance

Larger Pies
Indicate Higher
Pov Rate
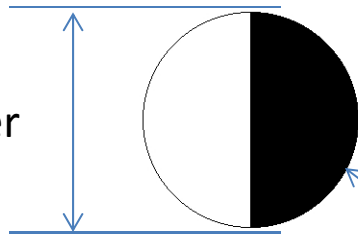
Black slice
represents CV
(SE as prop. of est.)
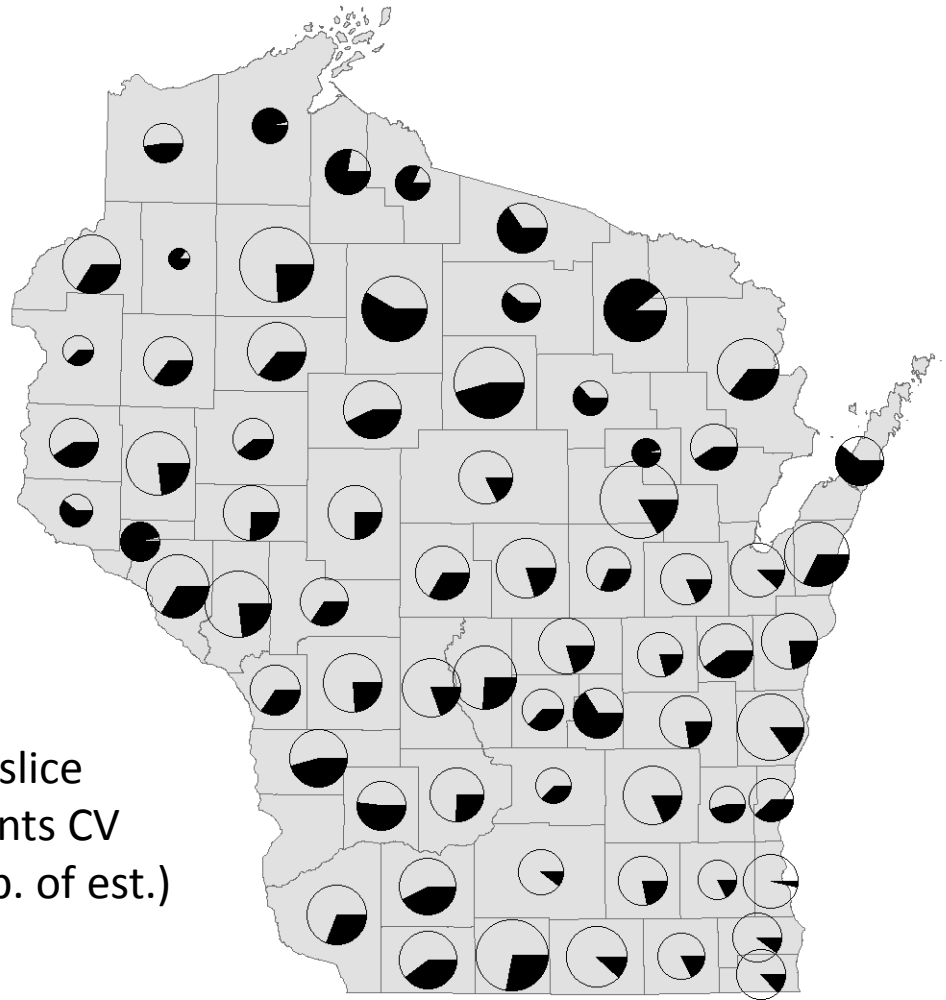
Combo…

Latino Poverty Rates by Significance

Black slice
represents CV
(SE as prop. of est.)

Percent Poverty

- ■ 0 - 14 (dark blue)
- ■ 15 - 23 (light blue)
- ■ 24 - 32 (green)
- ■ 33 - 53 (yellow)
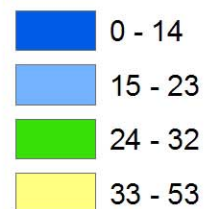
The Matrix...

Latino Poverty Rates by Significance

CV Significance

Low   High

Poverty   High   Low
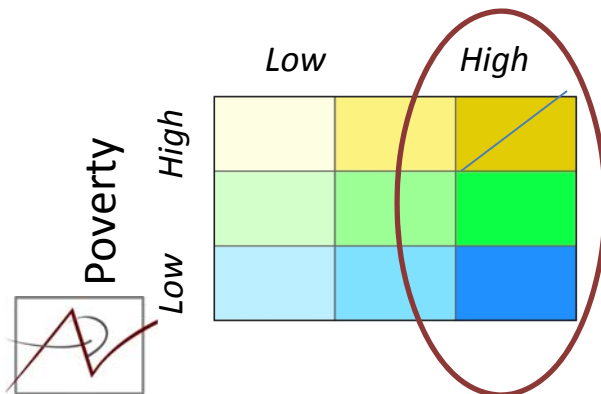
Back to basics…

Total Poverty Rates for Wisconsin Counties, ACS 2006-2010

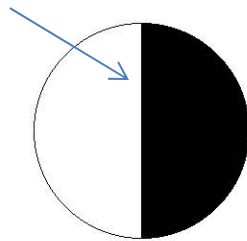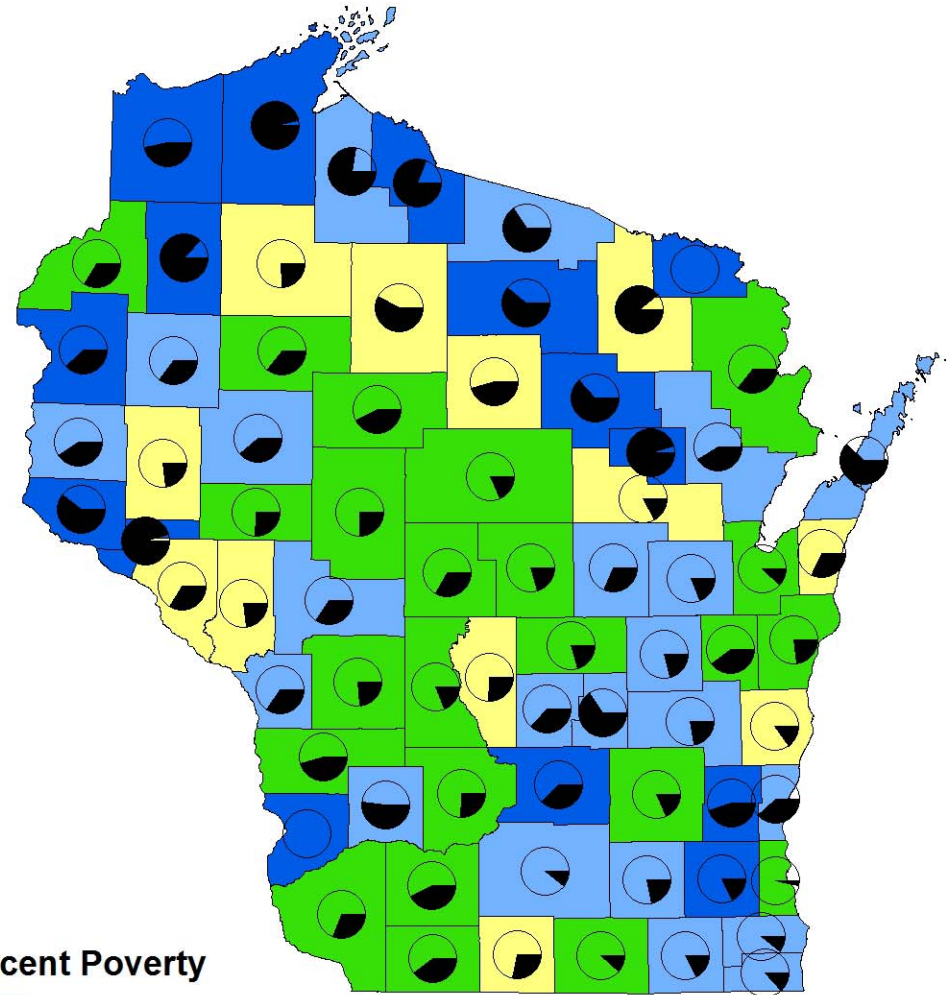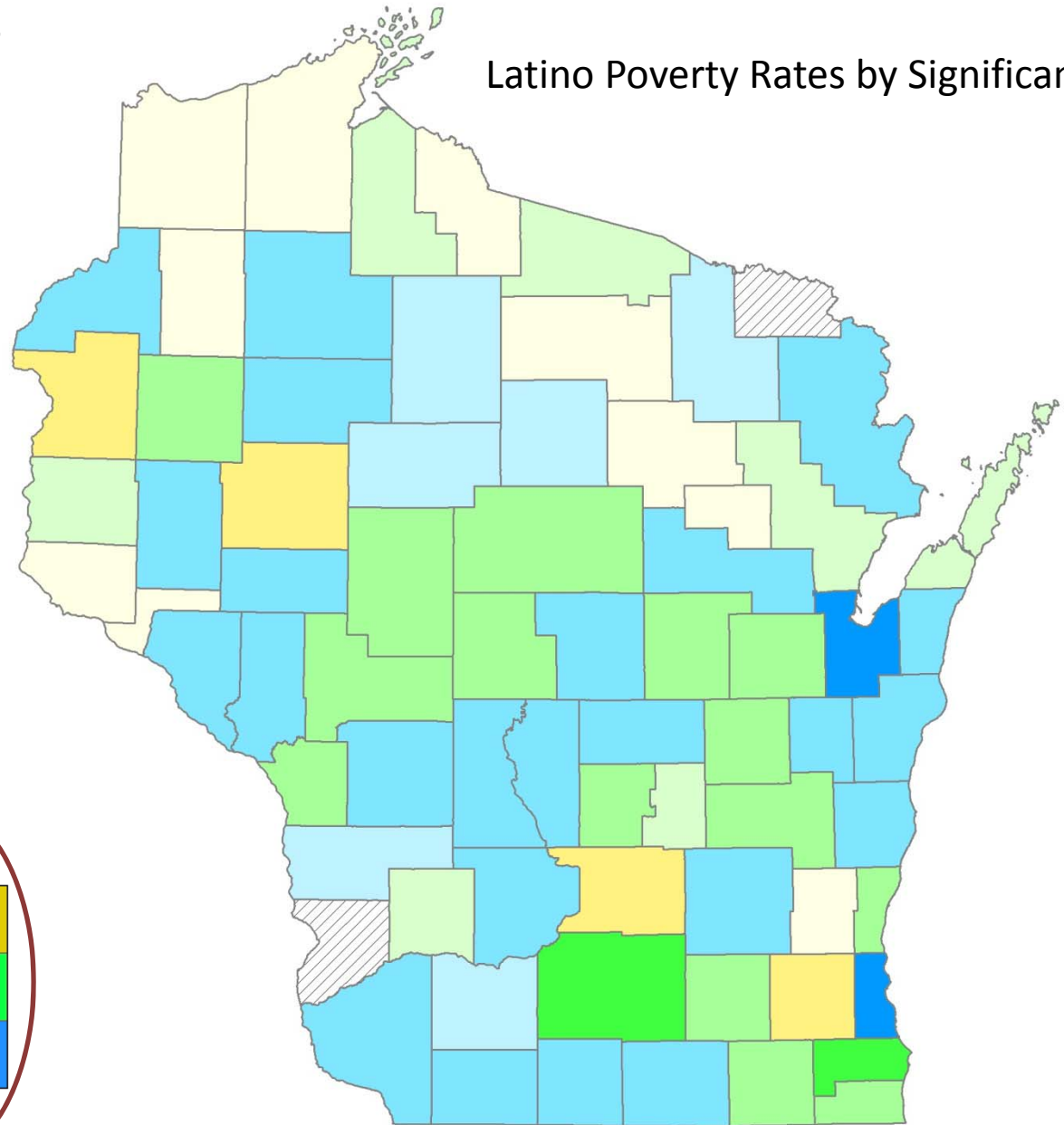| County	Total Poverty Rate	Margin of Error (±)*	County	Total Poverty Rate	Margin of Error (±)	County	Total Poverty Rate	Margin of Error (±)
Menominee	31.6	8.2	Bayfield	12.3	1.5	Oneida	9.9	1.4
Sawyer	20.1	2.3	Taylor	12.3	1.5	Polk	9.6	1.2
Milwaukee	19.2	0.5	Portage	12.1	1.0	Buffalo	9.5	1.5
Forest	18.9	2.8	Barron	11.9	1.3	Pepin	9.5	2.2
Ashland	18.6	2.5	Shawano	11.9	1.5	Sauk	9.4	1.1
Burnett	18.5	1.7	Vilas	11.9	1.6	Fond du Lac	9.2	0.9
Jackson	16.4	2.1	Oconto	11.8	1.3	Lafayette	9.1	1.3
Rusk	16.4	2.4	Price	11.8	1.9	Green	9.0	1.4
Iron	15.7	3.6	Kenosha	11.7	0.9	Jefferson	9.0	1.0
Dunn	15.3	2.0	Walworth	11.7	0.9	Manitowoc	8.9	1.0
Eau Claire	14.7	1.0	Dane	11.6	0.5	Columbia	8.7	1.3
Florence	14.6	3.8	Racine	11.5	1.0	Marathon	8.7	0.8
Monroe	14.1	1.8	Richland	11.5	2.2	Outagamie	8.5	0.9
Marinette	13.6	1.3	Trempealeau	11.5	1.2	Sheboygan	8.4	0.8
Vernon	13.6	1.7	Juneau	11.0	1.5	Wood	8.4	1.1
La Crosse	13.5	1.1	Langlade	11.0	1.8	Kewaunee	8.2	1.5
Grant	13.3	1.0	Marquette	10.9	1.5	Dodge	7.8	0.8
Washburn	13.1	2.2	Chippewa	10.7	1.2	Door	7.7	1.3
Waushara	13.1	1.7	Waupaca	10.6	1.3	Iowa	7.2	1.0
Crawford	12.9	1.8	Winnebago	10.5	0.8	St. Croix	6.4	1.1
Clark	12.8	1.4	Brown	10.3	0.6	Calumet	5.5	1.0
Douglas	12.8	1.4	Green Lake	10.3	2.1	Washington	5.4	0.8
Adams	12.6	1.4	Pierce	10.3	1.5	Ozaukee	4.5	0.8
Rock	12.4	1.0	Lincoln	10.0	1.4	Waukesha	4.4	0.3
						State	11.6	0.2

Applied Population Laboratory
Department of Community and Environmental Sociology
University of Wisconsin- Madison

*A margin of error is the difference between an estimate and its upper or lower confidence bounds. All published margins of error for the American Community Survey are based on a 90 percent confidence level

Total Poverty Rate

- 4% - <9% (Min: 4.4%)
- 9% - <11%
- 11% - <14% (WI: 11.6%)
- 14% - <18%
- 18%+ (Max: 31.6%)

Web Interactivity…

Latino Poverty Rates by Significance
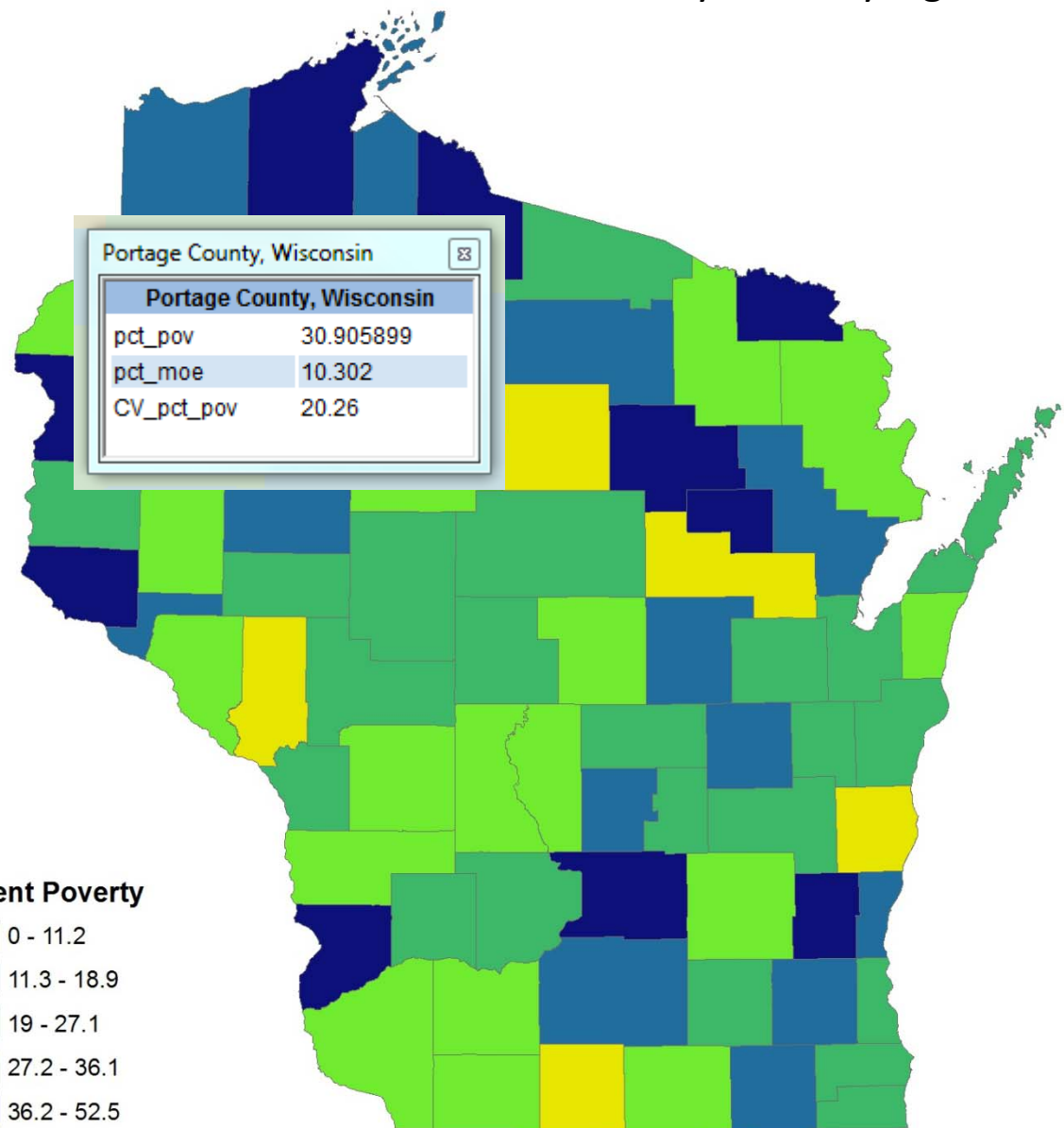
Portage County, Wisconsin

Portage County, Wisconsin	
pct_pov	30.905899
pct_moe	10.302
CV_pct_pov	20.26

Percent Poverty

- 0 - 11.2
- 11.3 - 18.9
- 19 - 27.1
- 27.2 - 36.1
- 36.2 - 52.5

Additional Reading

Thank you

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